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(54) TRUST EXCEPTION MANAGEMENT

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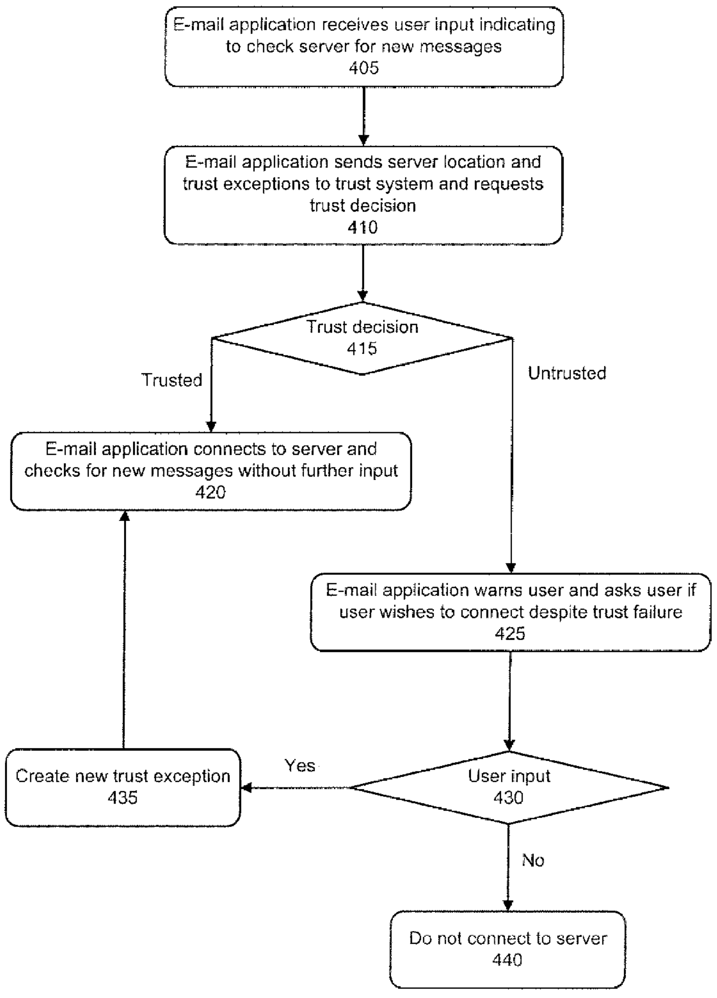
(52) **U.S. Cl.** **726/26**

(57) **ABSTRACT**

A machine implemented method includes storing a first data representing a prior exception to a first trust failure (e.g., expired certificate). The prior exception may be stored as part of establishing a first communication with a data processing system (e.g., a handheld device). The first communication may not be trustworthy. The method may determine, as part of establishing a second communication with the data processing system, that a second trust failure has occurred. The second trust failure (e.g., revoked certificate) indicates that the second communication may not be trustworthy. The method may determine whether the prior exception applies to the second trust failure. If the prior exception does not apply, the data processing system determines, automatically, whether to create a new exception for the second trust failure.


E-mail application receives user input indicating to check server for new messages
405
E-mail application sends server location and trust exceptions to trust system and requests trust decision
410
Trust decision
415
Trusted
Untrusted
E-mail application connects to server and checks for new messages without further input
420
E-mail application warns user and asks user if user wishes to connect despite trust failure
425
User input
430
Yes
Create new trust exception
435
No
Do not connect to server
440

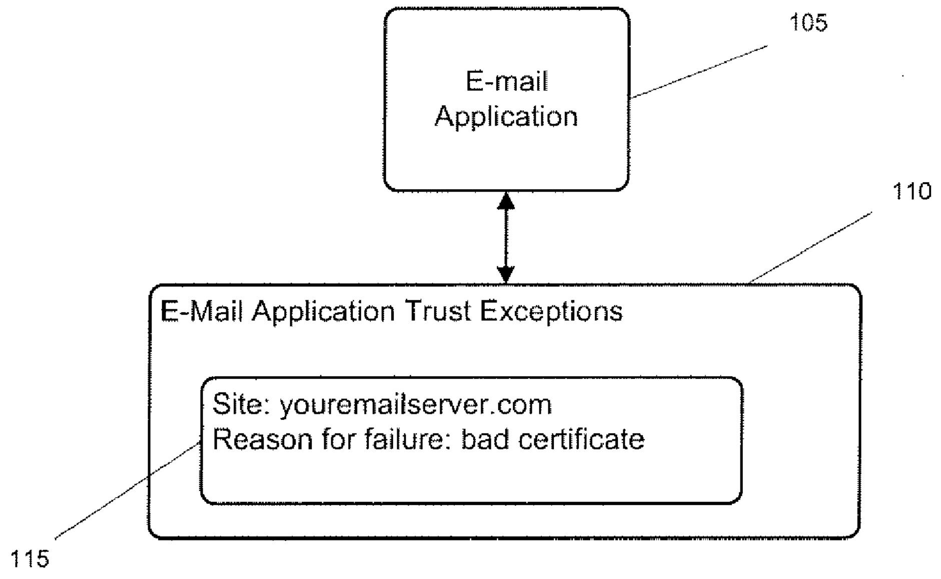

E-mail Application
105
110
E-Mail Application Trust Exceptions
Site: youremailserver.com
Reason for failure: bad certificate
115

Fig. 1

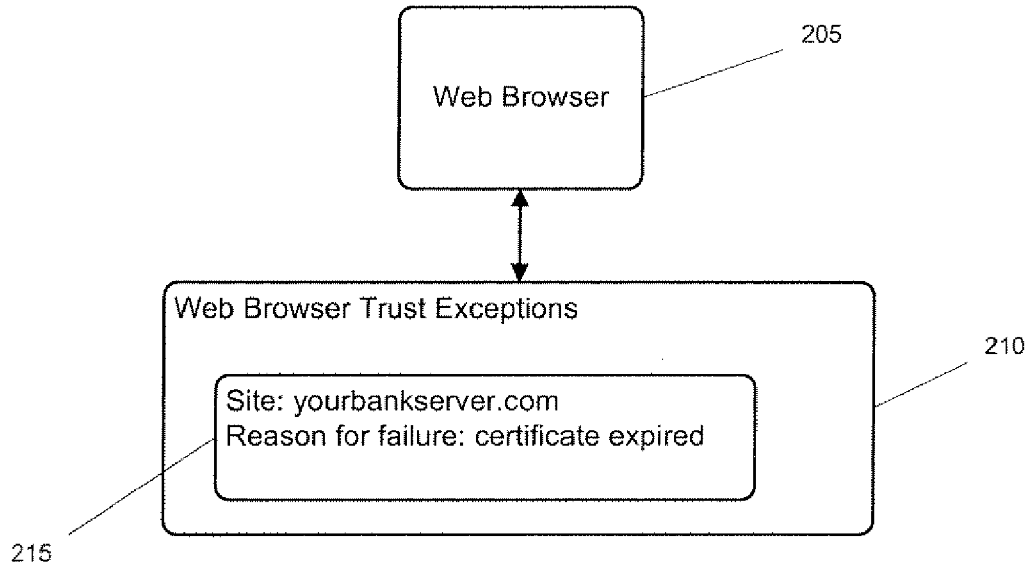

Web Browser
205
Web Browser Trust Exceptions
210
Site: yourbankserver.com
Reason for failure: certificate expired
215

Fig. 2

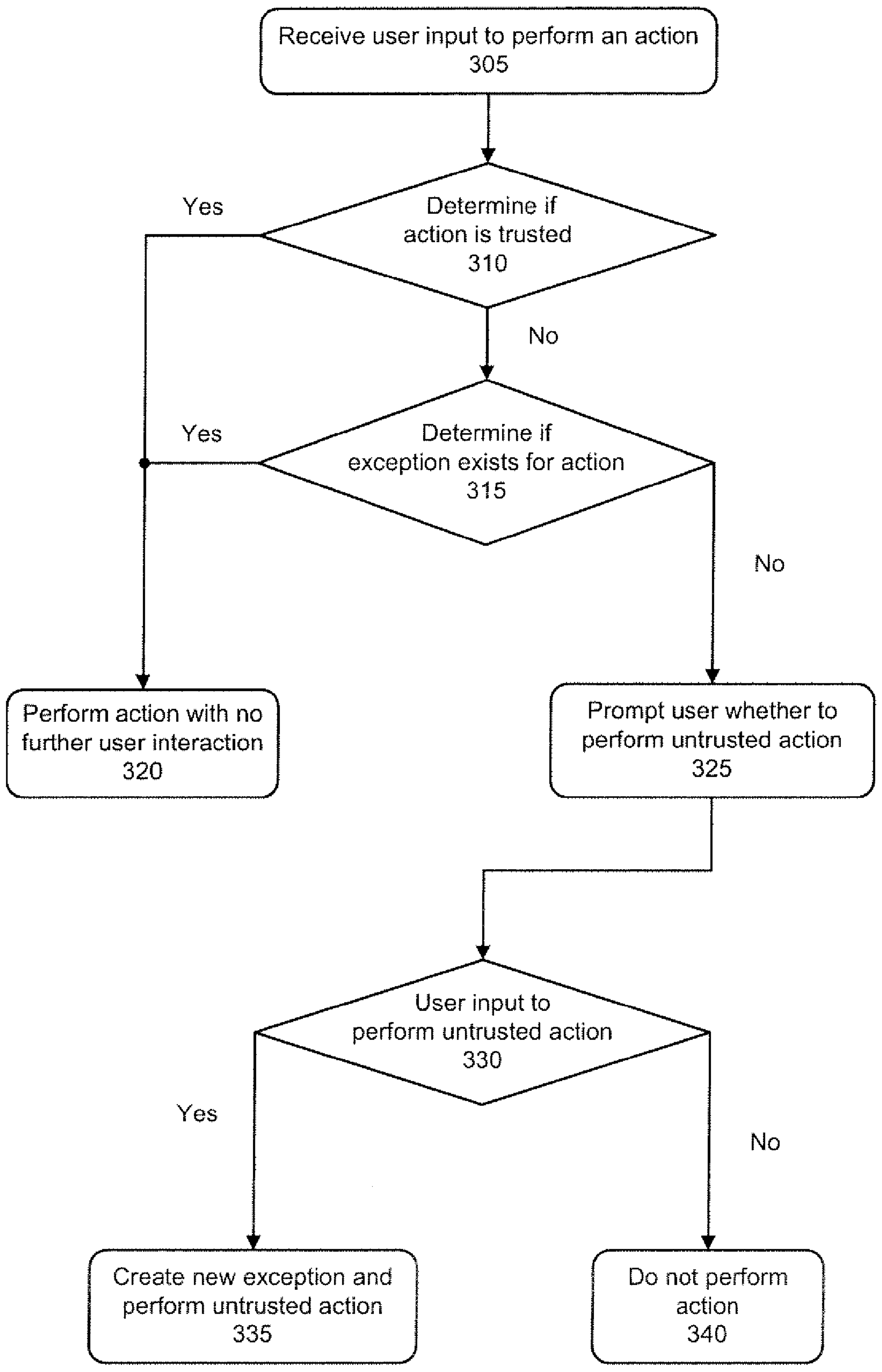

Receive user input to perform an action 305
Determine if action is trusted 310
Yes
No
Determine if exception exists for action 315
Yes
No
Perform action with no further user interaction 320
Prompt user whether to perform untrusted action 325
User input to perform untrusted action 330
Yes
No
Create new exception and perform untrusted action 335
Do not perform action 340

Fig. 3

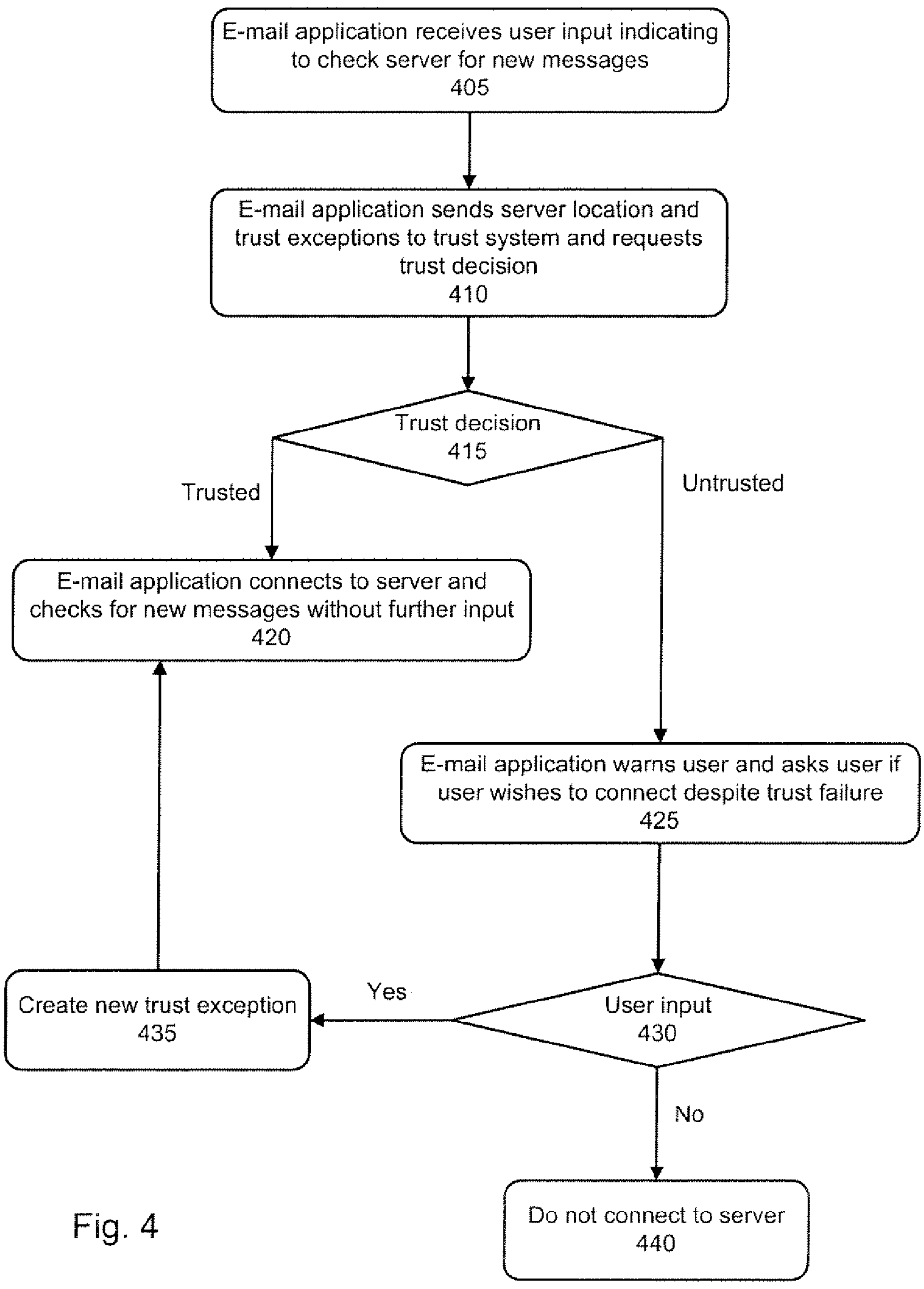

E-mail application receives user input indicating to check server for new messages
405
E-mail application sends server location and trust exceptions to trust system and requests trust decision
410
Trust decision
415
Trusted
Untrusted
E-mail application connects to server and checks for new messages without further input
420
E-mail application warns user and asks user if user wishes to connect despite trust failure
425
User input
430
Yes
No
Create new trust exception
435
Do not connect to server
440

Fig. 4

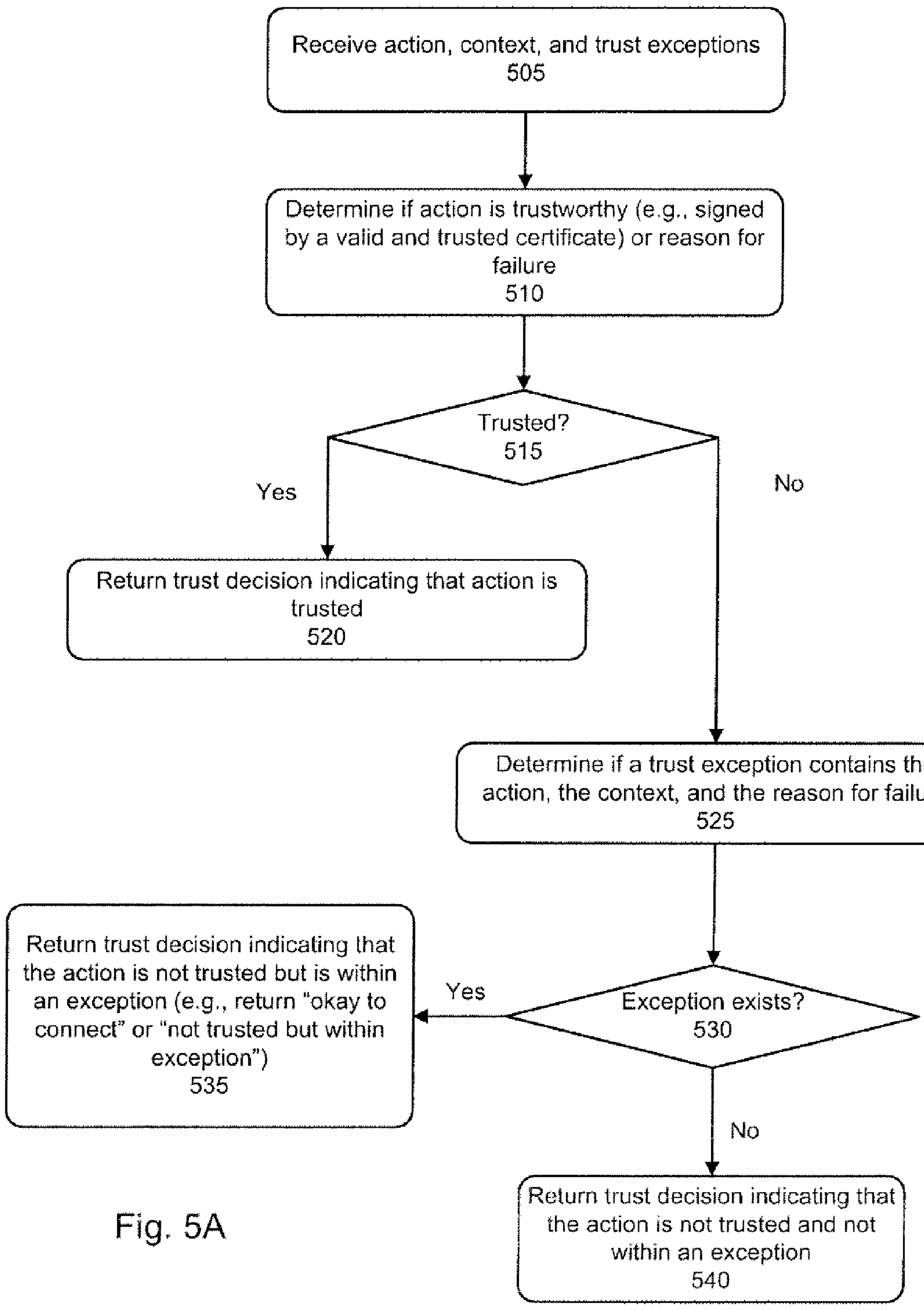

Receive action, context, and trust exceptions
505
Determine if action is trustworthy (e.g., signed by a valid and trusted certificate) or reason for failure
510
Trusted?
515
Yes
No
Return trust decision indicating that action is trusted
520
Determine if a trust exception contains the action, the context, and the reason for failure
525
Exception exists?
530
Yes
No
Return trust decision indicating that the action is not trusted but is within an exception (e.g., return "okay to connect" or "not trusted but within exception")
535
Return trust decision indicating that the action is not trusted and not within an exception
540

Fig. 5A

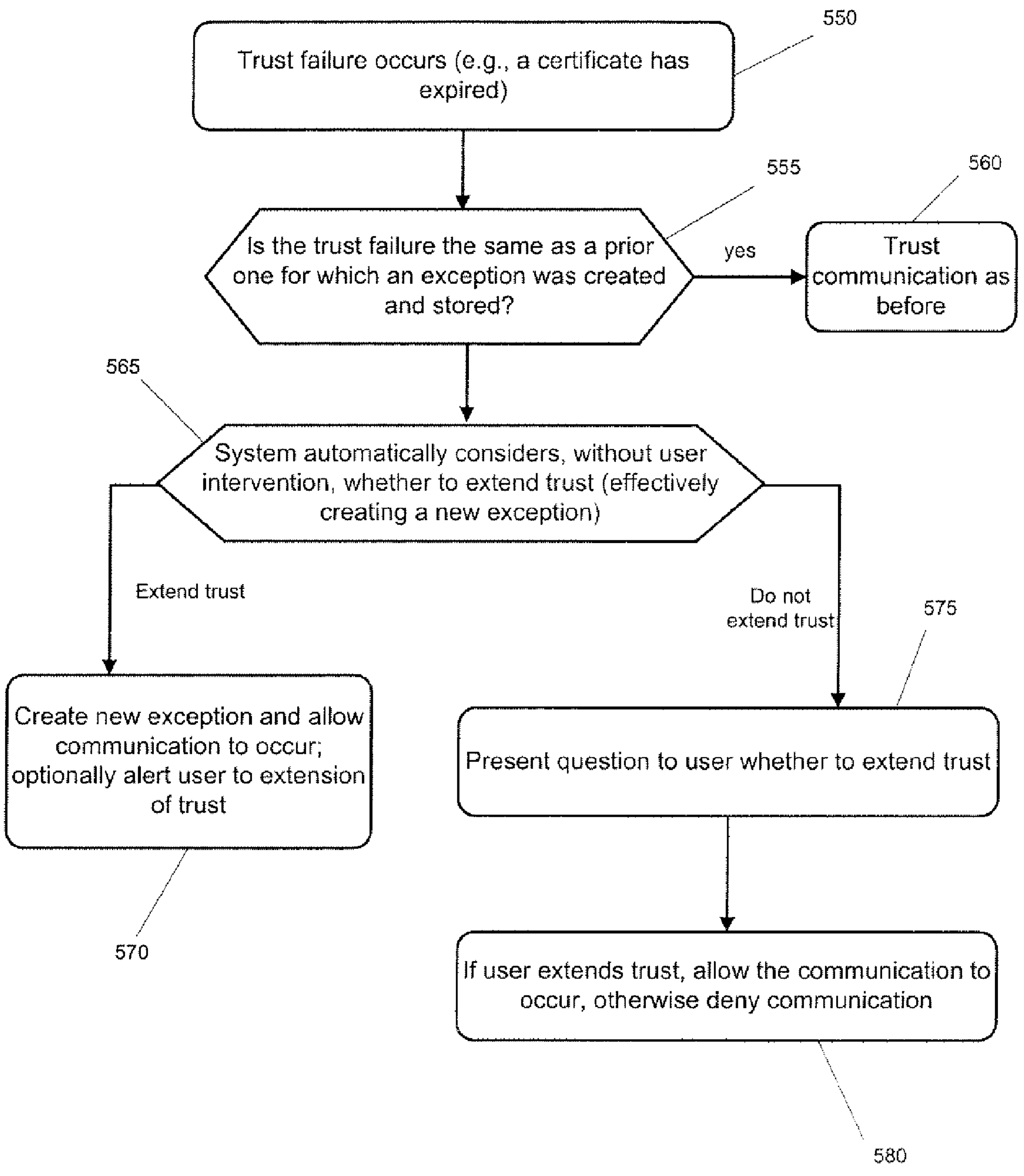

550
Trust failure occurs (e.g., a certificate has expired)
555
Is the trust failure the same as a prior one for which an exception was created and stored?
yes
560
Trust communication as before
565
System automatically considers, without user intervention, whether to extend trust (effectively creating a new exception)
Extend trust
Do not extend trust
575
Create new exception and allow communication to occur; optionally alert user to extension of trust
Present question to user whether to extend trust
570
If user extends trust, allow the communication to occur, otherwise deny communication
580

Fig. 5B

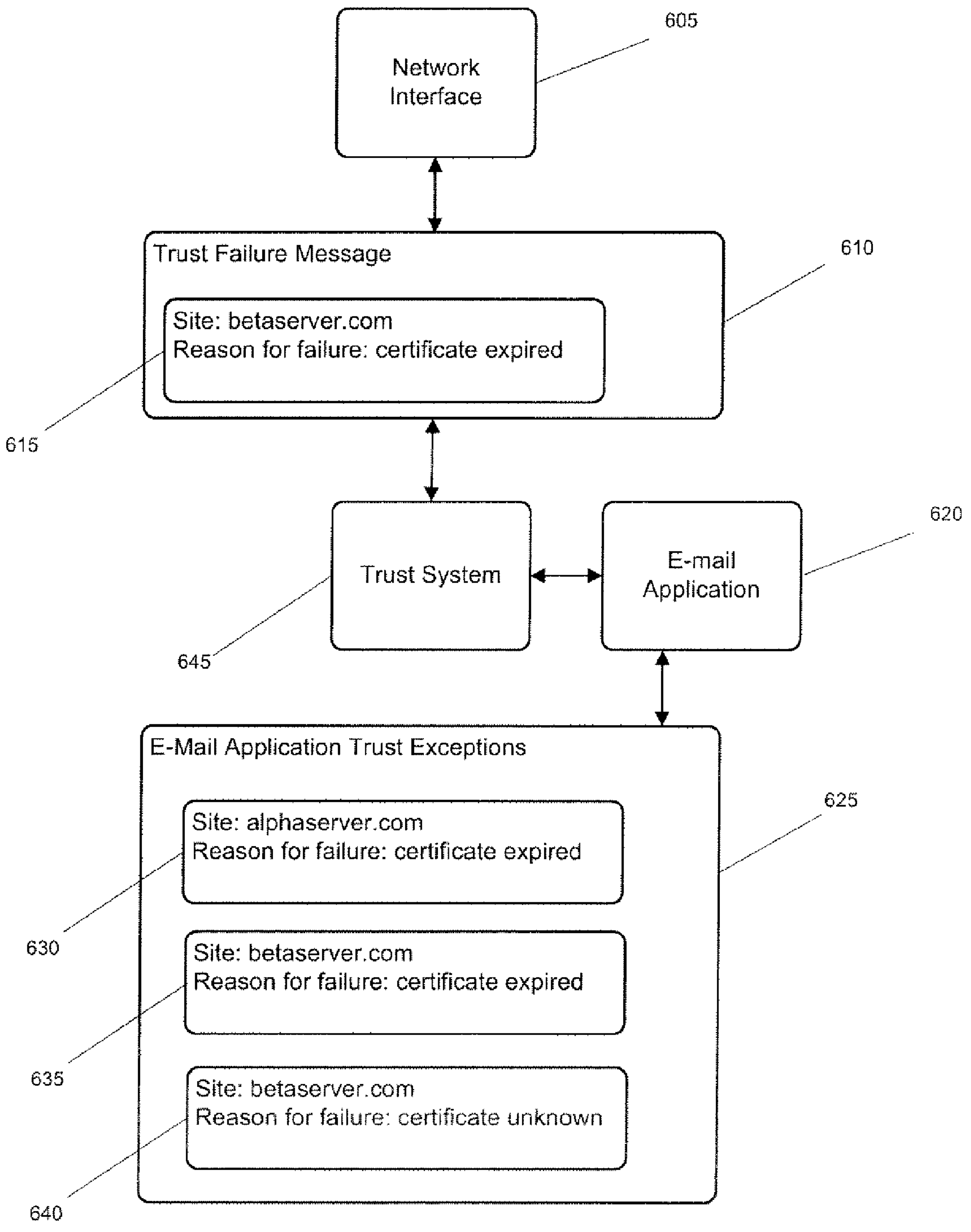

Network Interface
605
Trust Failure Message
610
Site: betaserver.com
Reason for failure: certificate expired
615
Trust System
E-mail Application
620
645
E-Mail Application Trust Exceptions
625
Site: alphaserver.com
Reason for failure: certificate expired
630
Site: betaserver.com
Reason for failure: certificate expired
635
Site: betaserver.com
Reason for failure: certificate unknown
640

Fig. 6

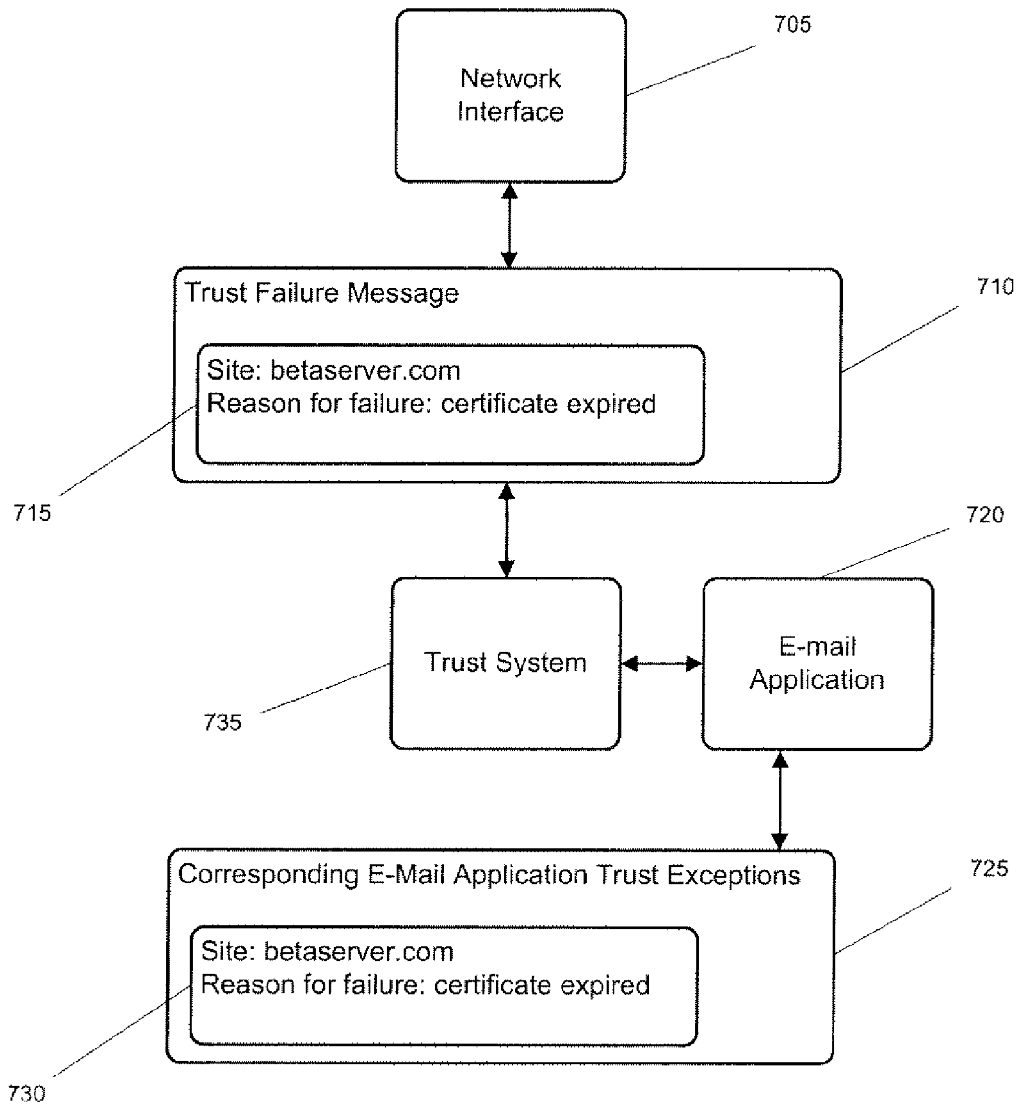

Network Interface
705
Trust Failure Message
710
Site: betaserver.com
Reason for failure: certificate expired
715
720
Trust System
E-mail Application
735
Corresponding E-Mail Application Trust Exceptions
725
Site: betaserver.com
Reason for failure: certificate expired
730

Fig. 7

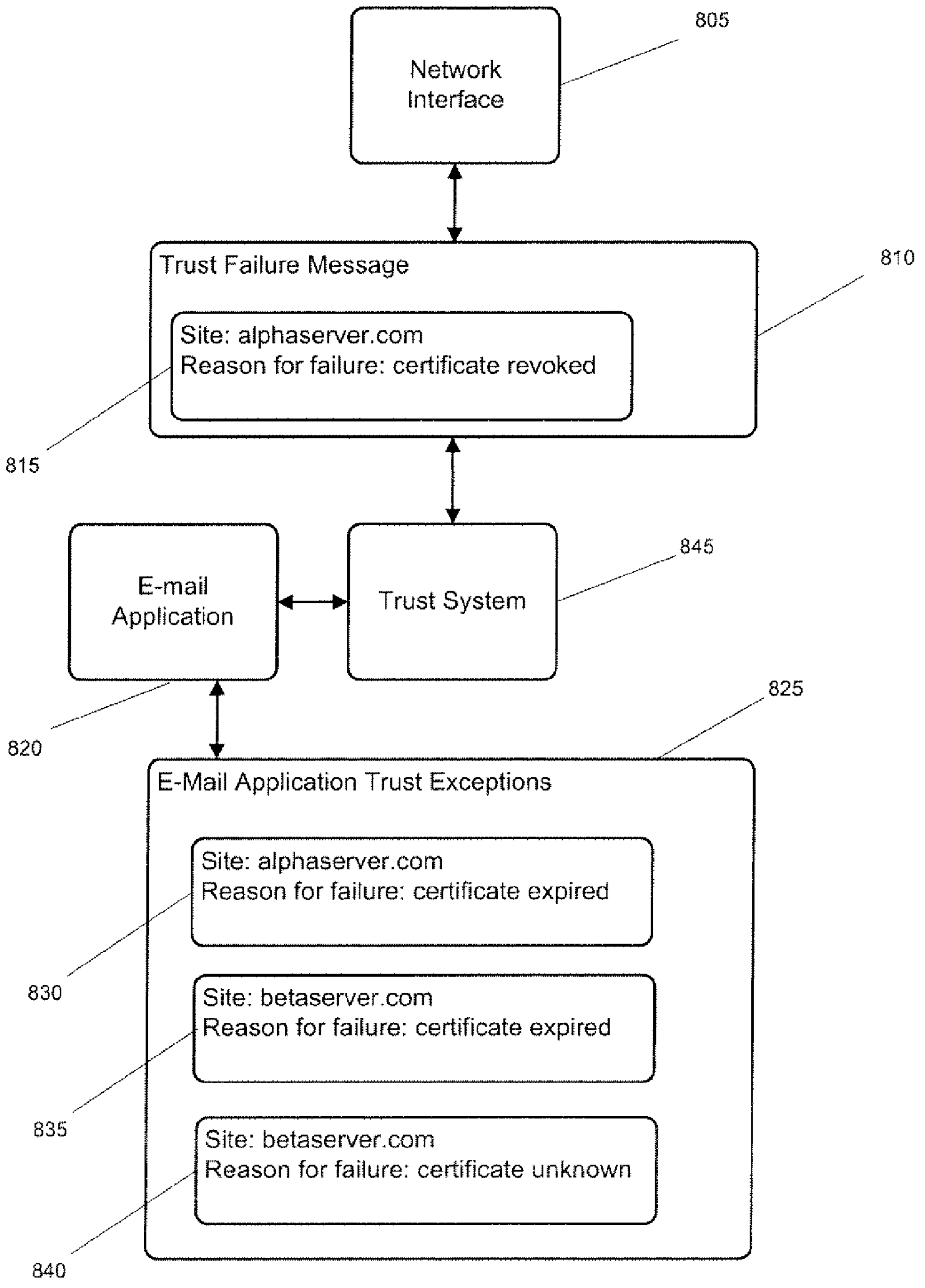

Network Interface
805
Trust Failure Message
810
Site: alphaserver.com
Reason for failure: certificate revoked
815
E-mail Application
Trust System
845
820
825
E-Mail Application Trust Exceptions
Site: alphaserver.com
Reason for failure: certificate expired
830
Site: betaserver.com
Reason for failure: certificate expired
835
Site: betaserver.com
Reason for failure: certificate unknown
840

Fig. 8

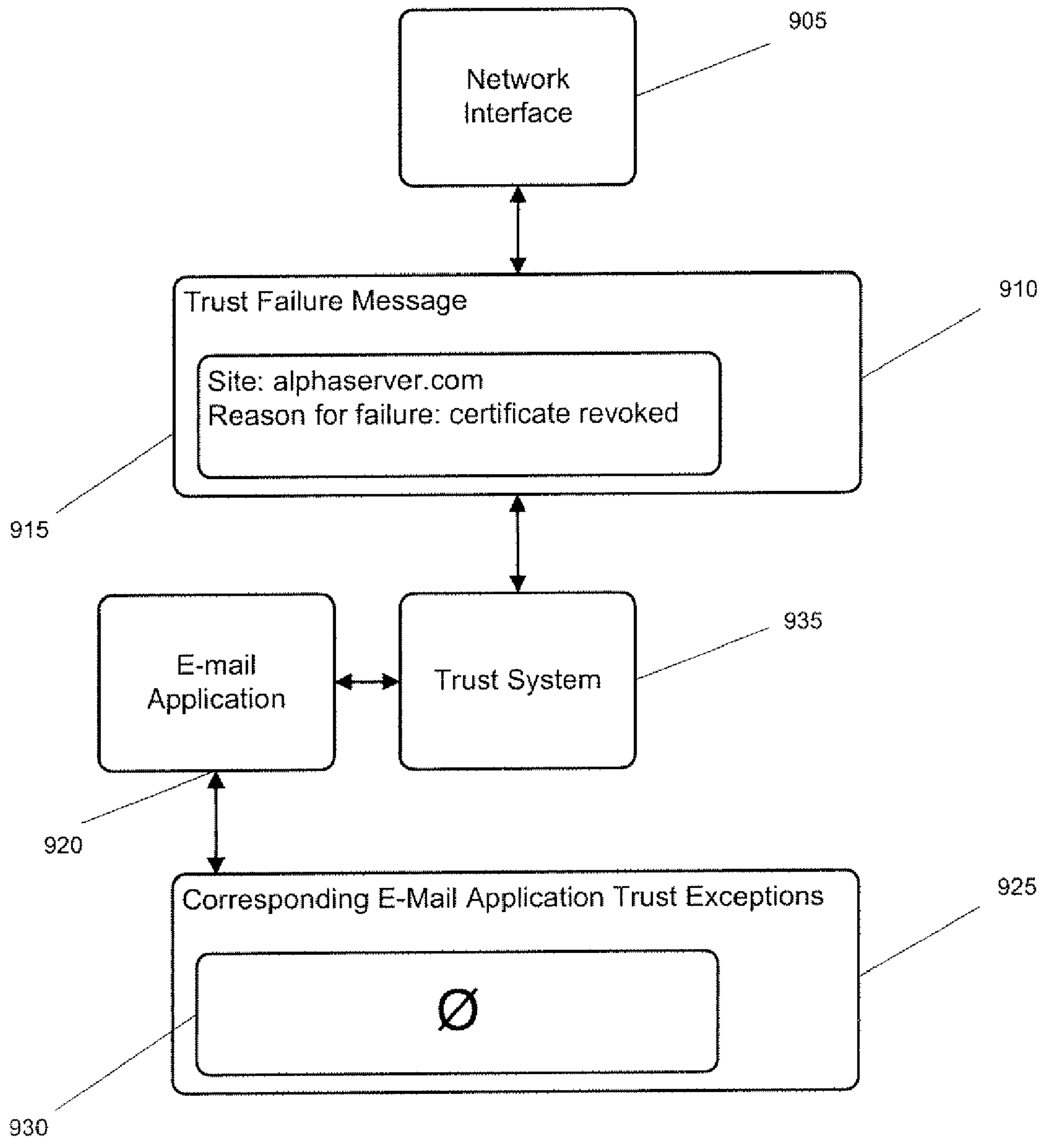

Network Interface
905
Trust Failure Message
910
Site: alphaserver.com
Reason for failure: certificate revoked
915
E-mail Application
Trust System
935
920
Corresponding E-Mail Application Trust Exceptions
925
Ø
930

Fig. 9

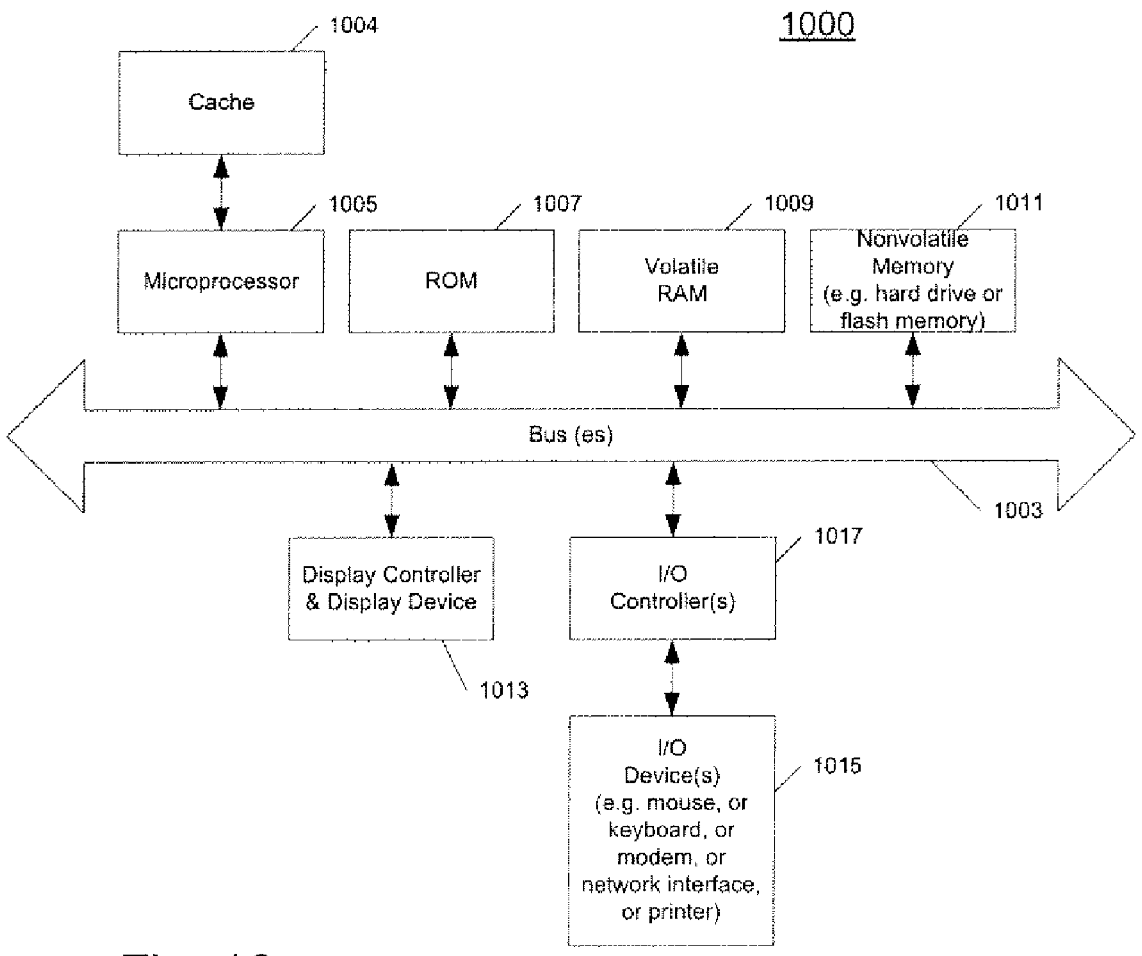

1000
1004
Cache
1005
Microprocessor
1007
ROM
1009
Volatile RAM
1011
Nonvolatile Memory (e.g. hard drive or flash memory)
Bus (es)
1003
Display Controller & Display Device
1013
I/O Controller(s)
1017
I/O Device(s) (e.g. mouse, or keyboard, or modem, or network interface, or printer)
1015

Fig. 10

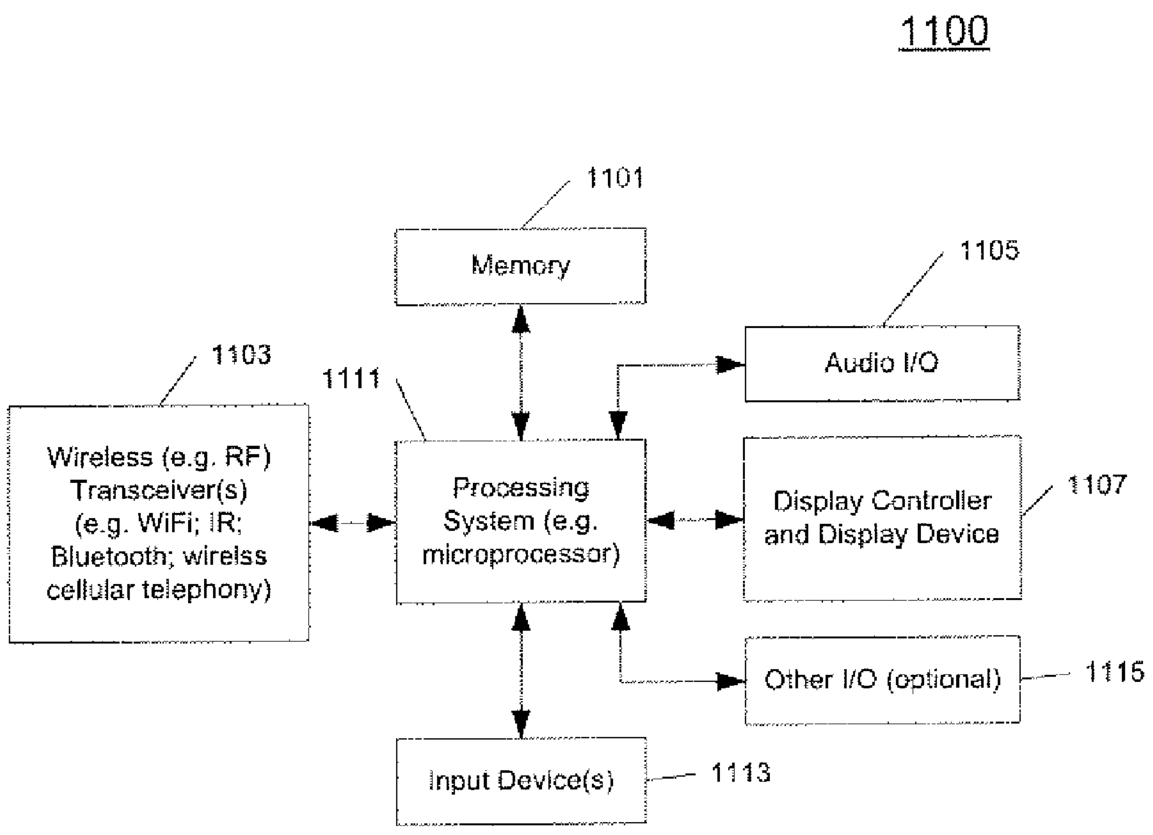

1100
1101
Memory
1105
Audio I/O
1103
1111
Wireless (e.g. RF) Transceiver(s) (e.g. WiFi; IR; Bluetooth; wirelss cellular telephony)
Processing System (e.g. microprocessor)
Display Controller and Display Device
1107
Other I/O (optional)
1115
Input Device(s)
1113

Fig. 11

TRUST EXCEPTION MANAGEMENT

[0001] This application claims priority to co-pending U.S. Provisional Patent Application No. 61/033,758 filed on Mar. 4, 2008, which provisional application is incorporated herein by reference in its entirety; this application claims the benefit of the provisional's filing date under 35 U.S.C. §119(e).

FIELD OF THE INVENTION

[0002] Embodiments of the invention relate to data processing systems, and more particularly, to managing trusted connections and applications of the data processing system.

SUMMARY OF THE DESCRIPTION

[0003] In one embodiment described herein, a machine implemented method includes determining, while in a first context, whether a first action is an un-trusted action and if the action is un-trusted, determining a reason for the failure to trust the first action. The method performs the un-trusted action if a first trust exception corresponds to the un-trusted action (e.g., connect to a web server), the reason for failure (e.g., expired certificate), and the first context (e.g., a web browser).

[0004] The method may also include receiving a user input indicating that the method should perform the un-trusted action, where the un-trusted action does not correspond to the first trust exception. The method may create a second trust exception corresponding to the un-trusted action, the reason for failure, and the first context, and perform the un-trusted action.

[0005] In another embodiment, a machine implemented method includes storing a first data representing a prior exception to a first trust failure (e.g., expired certificate). The prior exception may be stored as part of establishing a first communication with a data processing system (e.g., a handheld device). The first communication may not be trustworthy. The method may determine, as part of establishing a second communication with the data processing system, that a second trust failure has occurred. The second trust failure (e.g., revoked certificate) indicates that the second communication may not be trustworthy. The method may determine whether the prior exception applies to the second trust failure. If the prior exception does not apply, the data processing system determines, automatically, whether to create a new exception for the second trust failure.

[0006] Other features of the present invention will be apparent from the accompanying drawings and from the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present invention is illustrated by way of example and not limitation in the figures of the accompanying drawings in which like references indicate similar elements.

[0008] FIG. **1** shows a block diagram of one embodiment of an e-mail application and a trust exception set corresponding to the application.

[0009] FIG. **2** shows a block diagram of one embodiment of a web browser and a trust exception set corresponding to the web browser.

[0010] FIG. **3** shows a flow chart of one embodiment of a method of managing trust exceptions.

[0011] FIG. **4** shows a flow chart of one embodiment of a method of managing trust exceptions in an e-mail application.

[0012] FIG. **5**A shows a flow chart of one embodiment of a method of applying trust exceptions.

[0013] FIG. **5**B shows a flow chart of an embodiment in which a data processing system decides whether to extend a trust exception.

[0014] FIG. **6** shows a block diagram of one embodiment of an e-mail application and a trust failure message in a first state.

[0015] FIG. **7** shows a block diagram of one embodiment of an email application and a trust failure message in a second state.

[0016] FIG. **8** shows a block diagram of another embodiment of an e-mail application and a trust failure message in a first state.

[0017] FIG. **9** shows a block diagram of the another embodiment of an e-mail application and a trust failure message in a second state.

[0018] FIG. **10** shows one example of a typical computer system which may be used in conjunction with the embodiments described herein.

[0019] FIG. **11** shows one example of a data processing system which may be used in conjunction with the embodiments described herein.

DETAILED DESCRIPTION

[0020] Various embodiments and aspects of the inventions will be described with reference to details discussed below, and the accompanying drawings will illustrate the various embodiments. The following description and drawings are illustrative of the invention and are not to be construed as limiting the invention. Numerous specific details are described to provide a thorough understanding of various embodiments of the present invention. However, in certain instances, well-known or conventional details are not described in order to provide a concise discussion of embodiments of the present inventions.

[0021] Reference in the specification to one embodiment or an embodiment means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearance of the phrase "in one embodiment" in various places in the specification do not necessarily refer to the same embodiment.

[0022] Unless specifically stated otherwise, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a data processing system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

[0023] The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general-purpose systems may be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the required machine-implemented method operations. The required structure for a variety of these systems will appear from the description below. In addition, embodiments of the present invention are not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of embodiments of the invention as described herein.

[0024] At least certain embodiments of the inventions may be part of a digital media player, such as a portable music and/or video media player, which may include a media processing system to present the media, a storage device to store the media and may further include a radio frequency (RF) transceiver (e.g., an RF transceiver for a cellular telephone) coupled with an antenna system and the media processing system. In certain embodiments, media stored on a remote storage device may be transmitted to the media player through the RF transceiver. The media may be, for example, one or more of music or other audio, still pictures, or motion pictures.

[0025] The portable media player may include a media selection device, such as a touch screen input device, push-button device, movable pointing input device or other input device. The media selection device may be used to select the media stored on the storage device and/or the remote storage device. The portable media player may, in at least certain embodiments, include a display device which is coupled to the media processing system to display titles or other indicators of media being selected trough the input device and being presented, either through a speaker or earphone(s), or on the display device, or on both display device and a speaker or earphone(s).

[0026] Embodiments of the inventions described herein may be part of other types of data processing systems, such as, for example, entertainment systems or personal digital assistants (PDAs), or general purpose computer systems, or special purpose computer systems, or an embedded device within another device, or cellular telephones which do not include media players, or devices which combine aspects or functions of these devices (e.g., a media player, such as an iPod®, combined with a PDA, an entertainment system, and a cellular telephone in one portable device), or devices or consumer electronic products which include a multi-touch input device such as a multi-touch handheld device or a cell phone and handheld computer with a multi-touch input device.

[0027] FIG. **1** shows a block diagram of one embodiment of an e-mail application and a trust exception set corresponding to the application. E-mail application **105** accesses trust exceptions **110**, which includes trust exception **115**. In one embodiment, trust exceptions **110** may be a database of trust exceptions such as trust exception **115**. In one embodiment, trust exceptions **110** may be a flat text file or other data structure. In one embodiment, trust exception **115** includes a domain name or IP address of a networked data processing system accessed by application **105** and a reason for failure indicating why the application **105** could not access the networked system. In one embodiment, the reason for failure can be any failure or warning value included in the Transport Layer Security (TLS) protocol or Secure Sockets Layer (SSL) protocol, such as certificate revoked, certificate expired, etc. In one embodiment, a device cannot execute an application until a trust system has verified the code image corresponding to the application. Verification may fail for reasons like those above or other reasons. One embodiment creates trust exceptions for applications installed on a device, in order to allow execution of the application on the device despite local or remote verification failure of the application code image.

[0028] FIG. **2** shows a block diagram of one embodiment of a web browser and a trust exception set corresponding to the web browser. Web browser **205** connects to and accesses web browser trust exceptions **210**, which includes trust exception **215**. In one embodiment, a web browser is a context for trust exception management. In another embodiment, different tasks within a web browser or other application each constitute separate contexts for trust exception management. For example, accessing a secure banking website to view private bank records may be a context separate from accessing a secure banking website to access stock quotes. Context-based trust exception management accommodates the various demands for privacy and security that may change depending on the context in which a user application performs an action. For example, a user may be willing to accept an expired certificate in one context, but not in another. Context may be specified by a protocol (e.g., https), an application (e.g., web browser), user configuration (e.g., user creates contexts).

[0029] In one embodiment, trust exception **215** includes a reason for failure. As described below in greater detail in conjunction with FIGS. **3** and **4**, a reason for failure allows better management of trust exceptions by differentiating between new trust failures in a current context and previously encountered trust failures in the current context, or other contexts. For example, the user may have made an exception for an expired certificate in the context of an e-mail server. When a new failure caused by a certificate not matching the e-mail server domain name is received, the user would be informed of the new failure. In one embodiment, some reasons for failure are ranked according to severity. For example, a trust system may consider a revoked certificate to be more serious than an expired certificate. In one embodiment, creating a trust exception for a more serious trust failure provides an umbrella exception for less serious failures. In another embodiment, a trust failure may be ignored only if a trust exception exactly matches the trust failure. In still another embodiment, the user specifies whether an exception will be used as an umbrella exception.

[0030] FIG. **3** is a flow chart of one embodiment of a method of managing trust exceptions. At block **305**, the method receives a user input requesting that, for example, a user application perform an action. At decision **310**, the method determines whether the action is a trusted action. In one embodiment, a trust system determines whether the action is a trusted action. In one embodiment, the trust system might use known techniques to verify a certificate signing a website the user seeks to access. In one embodiment, the trust system might use known techniques to verify a signed application downloaded from a third party.

[0031] If the method determines that the action is trusted, the method performs the action at block **320** without further user interaction. For example, a user may seek to connect to a secure banking website. The method determines that the website certificate is in good order and may be trusted and allows the connection to the website without revealing the analysis of the website's trustworthiness to the user. If the method determines that the action is not trustworthy, the method then determines at decision **315** if a trust exception, such as trust exception **215**, exists for the current action and reason for failure. For example, FIGS. **6** and **7** illustrate locating a corresponding trust exception, allowing the method to proceed to block **320** and perform the desired action.

[0032] If, as illustrated in FIGS. **8** and **9**, no corresponding trust exception exists for the un-trusted action, the method proceeds to block **325** and prompts the user to indicate whether the method should allow performance of the un-trusted action. At block **330**, the method determines if the user wishes to perform the un-trusted action despite the trust failure. If the user indicates to perform the un-trusted action, the method, at block **335**, creates a new trust exception for the failure and action and then performs the un-trusted action. Otherwise, the method, at block **340**, does not perform the un-trusted action. In one embodiment, creation of a new trust exception allows a user to adjust settings related to the trust exception. For example, the user may indicate that the trust exception is only for the current case, not for later use (e.g., the user will be prompted if the failure occurs again). For example, the user may indicate that the trust exception is to be stored, but to remind the user if the method encounters the failure again in the future. For example, the user may indicate that the trust exception applies in contexts other than the user's current context, such as a web browser context in addition to the e-mail context in which the method creates the exception.

[0033] FIG. **4** shows a flow chart of one embodiment of a method of managing trust exceptions in an e-mail application. At block **405**, the method, executing in the context of an e-mail application, receives user input indicating that the e-mail application should connect to the e-mail server and check for new e-mail messages. In one embodiment, the user input sets a periodic timer on the e-mail application that causes the e-mail application to check for new messages whenever the designated time interval elapses. At block **410**, the method sends the location of the e-mail server and the e-mail application's set of trust exceptions to the trust system and requests a trust decision. In one embodiment, the e-mail application sends a memory reference to a data structure containing the trust exceptions. In one embodiment, the e-mail application sends a filename to the trust system.

[0034] If at decision **415**, the trust system indicates that the server location is trustworthy, the method at block **420** connects to the server and checks for new e-mail messages without requiring further action from the user. In one embodiment, the trust decision will indicate that the server can be trusted if the server certificate is trusted or if a trust exception exists. In one embodiment, the content of the trust decision may differ if the trust system does not trust the server but locates a corresponding exception, versus being trusted, as described in greater detail below in conjunction with FIG. **5**A. If the trust decision indicates that the server cannot be trusted, the method at block **425** warns the user and asks the user if the user wishes to connect to the server despite the failure of trust. If at decision **430** the user input requires connecting to the server despite the trust failure, the method creates a new trust exception at block **435**. At block **420**, the method connects to the server and checks for new messages. Otherwise, at block **440**, the method does not connect to the server.

[0035] FIG. **5**A is a flow chart of one embodiment of a method of applying trust exceptions. At block **505**, the method receives an action, context, and trust exceptions. In one embodiment, the method receives context indirectly. For example, context may be defined by the set of trust exceptions (e.g., all trust exceptions associated with a web browser). Trust exceptions may also reside in a global store or database, and include a context designation, allowing the method to discern between trust exceptions belonging to one or more contexts. At block **510**, the method determines if the action is trustworthy and, if not, the reason for trust failure. In one embodiment, the action corresponds to connecting to a secured server and determining if the connection is trustworthy corresponds to verifying that a trusted signature authority validly signs the server's certificate.

[0036] If at decision **515** the method has determined that the action is trusted, the method at block **520** returns a trust decision indicating that the action is trusted. Otherwise, the method determines at block **525** if a trust exception received at block **505** contains the action, the context, and the reason for failure. If at decision **530** the method has determined that a trust exception matches the current action-context-failure tuple, the method at block **535** returns a trust decision indicating that the action is trusted. Block **535** may be performed automatically by the system without requiring the user to authorize application of the trust exception. Otherwise, at block **540** the method returns a trust decision indicating that the action is not trusted and not within an exception and the user may be requested to device whether or not to accept the action (and hence implicitly to trust the action). In one embodiment, the trust decision specifies that the action is not trusted but corresponds to an existing trust exception. In another embodiment, the trust decision merely specifies that the action is trusted. In one embodiment, an action is verifying the code image of a new application on a device.

[0037] FIG. **5**B shows an example of an embodiment of the invention in which a trust exception is extended with at least the assistance of a data processing system. The assistance can be completely automatic and performed by the system and not require any user intervention or interaction. The user may be unaware of the assistance or the assistance may involve a recommendation requiring the user to accept or deny the recommendation. The assistance may be performed by a client data processing system or a server data processing system or a combination of both systems. In a preferred embodiment, a client data processing system stores information about prior trust failures and trust exceptions created for those trust failures in order to decide whether to extend a trust exception, thereby creating, in effect, a new trust exception (e.g., the system may extend an exception for an expired certificate, but not a revoked certificate).

[0038] In operation **550**, a data processing system determines that a trust failure has occurred; for example, in the process of establishing a secure (e.g., authenticated and encrypted) communication with a remote server, the data processing system has determined that a digital certificate associated with that remote server has expired. In operation **555**, the data processing system determines whether a previously created and stored trust exception applies to this trust failure which was determined in operation **550**. If the previously created and stored trust exception does apply (e.g., it is the same trust failure), then the communication is allowed to be established and is trusted as before (in operation **560**). However, if it is determined in operation **555** that the trust failure determined in operation **550** is different than a trust failure for which a trust exception was created, then processing proceeds to operation **565**. In operation **565**, the data processing system determines whether to extend a trust exception, thereby creating, in effect, a new trust exception for the current context. Operation **565** can be performed automatically without input or intervention from the user and the user may not be aware that an automatic trust extension is being considered; in other embodiments, the data processing system may provide an alert or message which tells the user that it is considering (or has decided) whether to extend a trust exception or the data processing system may make a decision but provide the user with an opportunity to accept or deny the trust extension, and this decision may be considered a recommendation to extend trust.

[0039] The data processing system, in operation **565**, can consider the context of the failure, the reason for the failure and the nature of the action or communication when determining whether to extend trust automatically. If, in operation **565**, the system decides to extend trust, then in operation **570**, the system creates and stores an extended trust exception which may be a new trust exception and allows the communication to occur. The system can, optionally, alert the user that the communication has been trusted even though the prior exception, in this context, etc., did not apply. If in operation **565**, the system decides not to extend trust, then the system presents, in operation **575**, a user interface to the user to ask the user whether or not to extend trust to this communication.

[0040] If the user, through the user interface, extends trust for the communication, then the communication is allowed and the trust exception is updated to indicate that, in the current context and action, the communication can be trusted; this updated trust exception is stored and used in future sessions in which a communication is tested/established for trust. In this manner, a trust exception can be incrementally changed over time and used in future automatic extensions of trust as shown in FIG. **5**B. In one embodiment, a data processing system is pre-configured with default rules for deciding when to automatically extend a trust exception. A data processing system may also provide a user interface through which a user may configure rules for automatically extending a trust exception.

[0041] FIG. **6** shows a block diagram of one embodiment of an e-mail application and a trust failure message in a first state. E-mail application **620** communicates the location of the e-mail server and contextually relevant trust exceptions **625** to trust system **645** to obtain a trust decision. Through network interface **605**, trust system **645** determines if the e-mail server betaserver.com is trusted. Trust failure message **610** received by trust system **645** through network interface **605** reports in message **615** that the site betaserver.com is not trusted and the reason for the trust failure is that betaserver.com's certificate has expired. Trust system **645** iterates through trust exceptions **630**, **635**, and **640**, as illustrated at block **525** in FIG. **5**A.

[0042] Turning to FIG. **7**, trust system **735** identifies trust exception **730** in contextually relevant trust exceptions **725**. The site betaserver.com occurs in both the trust exception **730** and the trust failure **715** received through network interface **705** as a result of e-mail application **720**'s request for a trusted connection to the site betaserver.com. The reason for failure in message **715**, certificate expired, also corresponds to the reason for failure within exception **730**. Thus, trust exception **725** includes a matching exception **730** for trust failure message **710**. Referring to FIG. **5**A, the method at block **535** returns a trust decision indicating that the action is trusted.

[0043] FIG. **8** shows a block diagram of another embodiment of an e-mail application and a trust failure message in a first state. E-mail application **820** requests a trust decision from trust system **845** regarding whether application **820** may safely connect to alphaserver.com in order to check for new e-mail messages. Application **820** provides contextually relevant trust exceptions **825** to trust system **845**. Trust system **845**, through network interface **805**, determines whether alphaserver.com is trusted. Trust system **845** receives trust failure message **810**, containing message **815** indicating that alphaserver.com is not trusted because a signing authority has revoked its certificate. Trust system **845** iterates through trust exceptions **830**, **835**, and **840**.

[0044] Turning to FIG. **9**, trust system **935**'s search through exceptions **925** to find an exception corresponding to message **915** has returned an empty set **930**. Trust system **935** will report trust failure message **910** to e-mail application **920** as in block **540** of FIG. **5**A. Thus, in order for application **920** to connect to alphaserver.com over network interface **905**, the method illustrated in FIG. **4** must receive user input at block **425** requiring that the application **920** connect to alphaserver.com despite the failure without an exception **915**. In one embodiment, network interface **905** may be a USB connection or cellular data network connection.

[0045] FIG. **10** shows one example of a data processing system that may be used with one embodiment the present invention. Note that while FIG. **10** illustrates various components of a computer system, it is not intended to represent any particular architecture or manner of interconnecting the components as such details are not germane to the present invention. It will also be appreciated that network computers and other data processing systems which have fewer components or perhaps more components may also be used with the present invention.

[0046] As shown in FIG. **10**, the computer system **1000**, which is a form of a data processing system, includes a bus **1003** which is coupled to a microprocessor(s) **1005** and a ROM (Read Only Memory) **1007** and volatile RAM **1009** and a non-volatile memory **1011**. The microprocessor **1005** is coupled to cache **1004**. The microprocessor **1005** may retrieve the instructions from the memories **1007**, **1009**, **1011** and execute the instructions to perform operations described above. The bus **1003** interconnects these various components together and also interconnects these components **1005**, **1007**, **1009**, and **1011** to a display controller and display device **1013** and to peripheral devices such as input/output (I/O) devices which may be mice, keyboards, modems, network interfaces, printers and other devices which are well known in the art. Typically, the input/output devices **1015** are coupled to the system through input/output controllers **1017**. The volatile RAM (Random Access Memory) **1009** is typically implemented as dynamic RAM (DRAM) which requires power continually in order to refresh or maintain the data in the memory.

[0047] The mass storage **1011** is typically a magnetic hard drive or a magnetic optical drive or an optical drive or a DVD RAM or a flash memory or other types of memory systems which maintain data (e.g. large amounts of data) even after power is removed from the system. Typically, the mass storage **1011** will also be a random access memory although this is not required. While FIG. **10** shows that the mass storage **1011** is a local device coupled directly to the rest of the components in the data processing system, it will be appreciated that the present invention may utilize a nonvolatile memory which is remote from the system, such as a network storage device which is coupled to the data processing system through a network interface such as a modem, an Ethernet interface or a wireless network. The bus **1003** may include one or more buses connected to each other through various bridges, controllers and/or adapters as is well known in the art.

[0048] The term "memory" as used herein is intended to encompass all volatile storage media, such as dynamic random access memory (DRAM) and static RAM (SRAM). Computer-executable instructions can be stored on non-volatile storage devices, such as magnetic hard disk, an optical disk, and are typically written, by a direct memory access process, into memory during execution of software by a processor. One of skill in the art will immediately recognize that the term "machine-readable storage medium" includes any type of volatile or nonvolatile storage device that is accessible by a processor.

[0049] FIG. **11** shows an example of another data processing system which may be used with one embodiment of the present invention. The data processing system **1100** shown in FIG. **11** includes a processing system **1111**, which may be one or more microprocessors, or which may be a system on a chip integrated circuit, and the system also includes memory **1101** for storing data and programs for execution by the processing system. The system **1100** also includes an audio input/output subsystem **1105** which may include a microphone and a speaker for, for example playing back music or providing telephone functionality through the speaker and microphone.

[0050] A display controller and display device **1107** provide a visual user interface for the user; this digital interface may include a graphical user interface which is similar to that shown on a Macintosh computer when running OS X operating system software. The system **1100** also includes one or more wireless transceivers **1103** to communicate with another data processing system, such as the system **1000** of FIG. **10**. A wireless transceiver may be a WiFi transceiver, an infrared transceiver, a Bluetooth transceiver, and/or a wireless cellular telephony transceiver. It will be appreciated that additional components, not shown, may also be part of the system **1100** in certain embodiments, and in certain embodiments fewer components than shown in FIG. **11** may also be used in a data processing system.

[0051] The data processing system **1100** also includes one or more input devices **1113** which are provided to allow a user to provide input to the system. These input devices may be a keypad or a keyboard or a touch panel or a multi touch panel The data processing system **1100** also includes an optional input/output device **1115** which may be a connector for a dock. It will be appreciated that one or more buses, not shown, may be used to interconnect the various components as is well known in the art. The data processing system shown in FIG. **11** may be a handheld computer or a personal digital assistant (PDA), or a cellular telephone with PDA like functionality, or a handheld computer which includes a cellular telephone, or a media player, such as an iPod, or devices which combine aspects or functions of these devices, such as a media player combined with a PDA and a cellular telephone in one device. In other embodiments the data processing system **1100** may be a network computer or an embedded processing device within another device, or other types of data processing systems which have fewer components or perhaps more components than that shown in FIG. **11**.

[0052] In the foregoing specification, the invention has been described with reference to specific exemplary embodiments thereof. It will be evident that various modifications may be made thereto without departing from the broader spirit and scope of the invention as set forth in the following claims. The specification and drawings are, accordingly, to be regarded in an illustrative sense rather than a restrictive sense.

What is claimed is:

1. A machine implemented method for processing data, the method comprising:

determining, in a first context, whether a first action is an un-trusted action and a reason for failure; and

performing the un-trusted action if a first trust exception corresponds to the un-trusted action, the reason for failure, and the first context.

2. The method of claim **1** further comprising:

receiving a user input indicating to perform the un-trusted action, wherein the un-trusted action does not correspond to the first trust exception;

creating a second trust exception corresponding to the un-trusted action, the reason for failure, and the first context; and

performing the un-trusted action.

3. The method of claim **1** wherein the first action is connecting to a secure server and wherein the reason for failure is one of the following: certificate revoked and certificate expired and certificate unknown.

4. The method of claim **1** wherein the first action is verifying a signed user application.

5. The method of claim **1** wherein the first context is a user application.

6. The method of claim **5** wherein the user application is one of the following: an e-mail application, a web browser, media management application, and a personal finance application.

7. A machine implemented method comprising:

storing first data representing a prior exception to a first trust failure, the first trust failure indicating, as part of establishing a first communication with a data processing system, that the first communication may not be trustworthy;

determining, as part of establishing a second communication with the data processing system, that a second trust failure has occurred, the second trust failure indicating that the second communication may not be trustworthy;

determining whether the prior exception applies to the second trust failure and if it does not, determining, automatically by the data processing system, whether to create a new exception for the second trust failure.

8. The method as in claim **7** wherein the data processing system determines whether to create the new exception without requiring user interaction to create the new exception.

9. The method as in claim **8** wherein the data processing system determines whether to create the new exception by comparing the first trust failure and the second trust failure and wherein the comparing comprises comparing a context of the first trust failure and a context of the second trust failure.

10. A machine-readable storage medium storing instructions which when executed by a data processing system cause the data processing system to perform a method of processing data, the method comprising:

determining, in a first context, whether a first action is an un-trusted action and a reason for failure; and

performing the un-trusted action if a first trust exception corresponds to the un-trusted action, the reason for failure, and the first context.

11. The machine-readable storage medium of claim **10**, the method further comprising:

receiving a user input indicating to perform the un-trusted action, wherein the un-trusted action does not correspond to the first trust exception;

creating a second trust exception corresponding to the un-trusted action, the reason for failure, and the first context; and

performing the un-trusted action.

12. The machine-readable storage medium of claim **10** wherein the first action is connecting to a secure server and wherein the reason for failure is one of the following: certificate revoked and certificate expired and certificate unknown.

13. The machine-readable storage medium of claim **10** wherein the first action is verifying a signed user application.

14. The machine-readable storage medium of claim **10** wherein the first context is a user application.

15. The machine-readable storage medium of claim **14** wherein the user application is one of the following: an e-mail application, a web browser, media management application, and a personal finance application.

16. A machine-readable storage medium storing instructions which when executed by a data processing system cause the data processing system to perform a method of processing data, the method comprising:

storing first data representing a prior exception to a first trust failure, the first trust failure indicating, as part of establishing a first communication with the data processing system, that the first communication may not be trustworthy;

determining, as part of establishing a second communication with the data processing system, that a second trust failure has occurred, the second trust failure indicating that the second communication may not be trustworthy;

determining whether the prior exception applies to the second trust failure and if it does not, determining, automatically by the data processing system, whether to create a new exception for the second trust failure.

17. The machine-readable storage medium as in claim **16** wherein the data processing system determines whether to create the new exception without requiring user interaction to create the new exception.

18. The machine-readable storage medium as in claim **17** wherein the data processing system determines whether to create the new exception by comparing the first trust failure and the second trust failure and wherein the comparing comprises comparing a context of the first trust failure and a context of the second trust failure.

19. A data processing system comprising:

means for determining, in a first context, whether a first action is an un-trusted action and a reason for failure; and

means for performing the un-trusted action if a first trust exception corresponds to the un-trusted action, the reason for failure, and the first context.

20. The data processing system of claim **19** further comprising:

means for receiving a user input indicating to perform the un-trusted action, wherein the un-trusted action does not correspond to the first trust exception;

means for creating a second trust exception corresponding to the un-trusted action, the reason for failure, and the first context; and

means for performing the un-trusted action.

21. The data processing system of claim **19** wherein the first action is connecting to a secure server and wherein the reason for failure is one of the following: certificate revoked and certificate expired and certificate unknown.

22. The data processing system of claim **19** wherein the first action is verifying a signed user application.

23 The data processing system of claim **19** wherein the first context is a user application.

24. The data processing system of claim **23** wherein the user application is one of the following: an e-mail application, a web browser, media management application, and a personal finance application.

25. A data processing system comprising:

means for storing first data representing a prior exception to a first trust failure, the first trust failure indicating, as part of establishing a first communication with a data processing system, that the first communication may not be trustworthy;

means for determining, as part of establishing a second communication with the data processing system, that a second trust failure has occurred, the second trust failure indicating that the second communication may not be trustworthy;

means for determining whether the prior exception applies to the second trust failure and if it does not, determining, automatically by the data processing system, whether to create a new exception for the second trust failure.

26. The data processing system as in claim **25** wherein the data processing system determines whether to create the new exception without requiring user interaction to create the new exception.

27. The data processing system as in claim **26** wherein the means for determining whether to create the new exception comprises:

means for comparing the first trust failure and the second trust failure, wherein the comparing comprises comparing a context of the first trust failure and a context of the second trust failure.

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